

THE VASCULAR IMAGING LAB AT UW MEDICINE

Saving Lives at Home and Around the World

The Vascular Imaging Laboratory

The VIL at UW Medicine includes a multi-disciplinary group of researchers. Together, they advance scientific knowledge, education and training in the fields of magnetic resonance imaging (MRI) and vascular medicine, and their goal is to identify the causes of cardiovascular disease initiation, progression and complications. Additionally, they intend to serve as key collaborators for other researchers, both locally and globally.

WHEN WORKING PROPERLY, the cardiovascular system transports blood circulated by the heart and distributed by blood vessels throughout the body. When this system is compromised, a number of potentially life-threatening cardiovascular diseases can result, such as stroke, peripheral artery disease (PAD) and aortic dissection. More than 140,000 people in the U.S. alone die each year from stroke, and it is a leading cause of serious long-term disability in North America.

PAD, which can lead to severe pain in the legs, and in more advanced cases, gangrene and limb loss, is estimated to affect 12–20 percent of people over age 60. And aortic dissection, while less common, is a life-threatening condition of the arteries that requires immediate treatment.

Many of the worst outcomes of these cardiovascular diseases can be prevented with early detection and proper treatment. The Vascular Imaging Laboratory (VIL) at UW Medicine is making groundbreaking progress in detecting, diagnosing and treating strokes, PAD and aortic dissections with advances in high-resolution imaging and new methods of drug delivery.

Given that *everyone* is at some risk for these debilitating diseases, we envision the creation of an **international program for medical imaging research and stroke risk assessment** that will facilitate global collaborations to improve and save lives.

We invite you to join us in supporting the innovative, far-reaching work of the Vascular Imaging Laboratory, described in more detail below.

Cardiovascular Disease Research at the VIL: Three Areas of Excellence

Preventing Strokes With High-resolution Imaging Techniques

When blood supply to the brain is interrupted or severely reduced, the brain is deprived of oxygen and nutrients. It only takes a few minutes for brain cells to begin to die, causing a stroke. A quarter of patients age 65 and older will die within a year following a first stroke, and more than half will die within the first five years.

Over the past 20 years, researchers at VIL have applied high-resolution imaging techniques in long-term studies to better understand the development of atherosclerosis (commonly referred to as hardening of the arteries). They have identified specific features of atherosclerosis that are associated with rapid disease progression and that may be indicators of future stroke. Soon, these advanced arterial imaging techniques may allow physicians to intervene early and prevent this disabling disease.

This expertise in stroke is complemented by two newer areas of vascular research: improved aneurysm prediction and peripheral artery disease (PAD).

Improved Aneurysm Prediction and Aortic Dissection: Life and Death

A “type B” aortic dissection is a tear in the descending aorta in the chest. Predicting whether a patient with this dissection will eventually develop an aneurysm or a complete aortic rupture is difficult — yet it is also a matter of life or death. A majority of patients with type B aortic dissection can be successfully treated with medications. If aortic dissections lead to aneurysms — a bulge in a section of the aorta where blood collects — the likelihood of a life-threatening aortic rupture is heightened. For those patients, surgery is required.

Accurately predicting the likelihood of an aneurysm or an aortic rupture helps physicians determine the most appropriate course of treatment for patients with aortic dissections.

Researchers at the VIL are collaborating with University of Washington investigators in vascular surgery, radiology, internal medicine and engineering to study factors that may contribute to aneurysm formation. They are developing methods to assess the strain on the aortic wall with advanced techniques to measure blood flow and with computational modeling. They are also developing novel, noninvasive imaging methods to quantify the level of inflammation in the aorta and determine whether patients with greater vessel wall inflammation are at higher risk for rupture.

Ultimately, the goal of this research is to help physicians provide more personalized care by helping them assess which patients can be safely managed with prescriptions, and which would be better served by early surgery.

Peripheral Artery Disease: A New Method of Drug Delivery

Atherosclerosis in the lower extremities causes PAD, which can result in pain in the leg muscles when walking and, in more severe cases, pain when resting, gangrene, the need for amputation and increased risk of death.

Each year, more than half a million people undergo a nonsurgical procedure that opens blocked arteries in the leg with balloon dilation (angioplasty). Unfortunately, up to two-thirds of these arteries will develop recurrent narrowing and blockage (occlusion) within a year following treatment. This narrowing is caused by growth of a scar-like tissue thought to be driven by inflammation. A number of drugs may be able to reduce scarring and inflammation, but they carry serious side effects when administered systemically.

Researchers at the VIL, collaborating with investigators at the University of California, San Francisco, are conducting studies to test the effectiveness of local delivery of anti-inflammatory drugs directly into the artery wall at the time of angioplasty. This process may reduce the risk of systemic side effects. VIL researchers also are developing high-resolution, noninvasive imaging techniques to more precisely measure the amount of scarring and inflammation in the artery wall following treatment.

These studies will examine the effectiveness of delivering drugs locally to keep arteries open and unobstructed and shed light on mechanisms and risk factors leading to recurrent narrowing and blockage following angioplasty. They also will aid in the development of new drugs to prevent scarring and inflammation and improve the long-term durability of angioplasty in patients with PAD.

Our Vision: The International Vascular Imaging Research Program

Strokes and other cardiovascular diseases exact a heavy toll on the health of the public around the world. Globally, stroke is the second leading cause of death. In China, stroke is the No. 1 cause of death, and it is four to five times more prevalent than in Western countries.

Clinicians and researchers at the VIL have developed highly productive international collaborations with medical centers throughout North America, Asia and Europe dedicated to reducing the incidence of stroke. And they are developing advanced arterial imaging techniques that identify individuals at increased risk for stroke so physicians can intervene as early as possible.

As opportunities for international collaboration continue to increase, UW Medicine is expanding the scope of its vision with the goal of creating the ***International Vascular Imaging Research Program***. This program will help researchers at the VIL and at other cardiovascular research centers around the world to collaborate on large-scale, multi-site studies. These studies will focus on the prevention of stroke and other cardiovascular diseases, and they will help facilitate the sharing of technology and knowledge across global borders for the benefit of all.

The International Vascular Imaging Research Program will:

- Develop new imaging techniques;
- Transfer vascular imaging technology developed at UW Medicine to universities and hospitals in North America, Asia and Europe;
- Train visiting scholars and research fellows in advanced imaging techniques;
- Assist in the design, training and implementation of research protocols with collaborators at sites in North America and Asia, many involving former UW Medicine research fellows; and
- Dedicate the VIL as a core lab facility that provides interpretation of imaging data obtained from an international network of research centers.

Opportunities to Invest

The Vascular Imaging Lab is one of few such facilities to receive project funding from both the U.S. National Institutes of Health (NIH) and the National Natural Science Foundation in China. However, government funding for major international research ventures is scarce, and we hope to raise \$10 million in endowed support to accomplish our goal: the creation of the International Vascular Research Imaging Program.

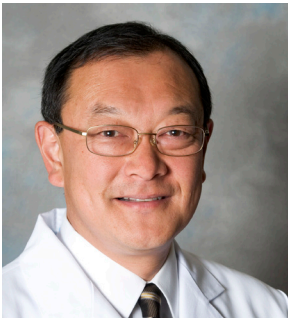
However, any investment in the Vascular Imaging Lab — opportunities to support students, analysis, conferences, collaborations, as described below — will also play an important role in improved treatments for people around the world.

Program Resource	Purpose	Investment
Post-doctorate Senior Fellows and Graduate Students	Recruit fellows from North America, Asia and Europe, train them in vascular imaging techniques and research, and provide tuition and salary for graduate students in related fields.	\$85,000 supports a fellow for one year. \$25,000 provides a student tuition for one year. \$72,000 provides student salary for one year.
Analysis of Image-related Data	Analyze imaging data collected during international studies and clinical trials.	\$500,000 supports personnel and equipment costs for image analysis from a five-year, multi-center study.
Statistical Analysis	Support for the program’s biostatistician.	\$35,000 supports a statistician for one year.
Learning and Idea Exchange	Provide fees for educational conferences, including registration, travel and lodging.	\$50,000 provides educational and training costs for one year.
Director’s Fund	Enables the VIL’s director to support collaborative studies, new imaging technical development, and testing and pilot data collection for new programs.	\$40,000 supports personnel and development costs for one year.
Vascular Imaging Research Endowed Chair	Provides income in perpetuity to be used to recruit and retain the best faculty, attract students, and provide foundational support for the program.	\$2 million endowment.

For More Information

To support the VIL or to learn more about UW Medicine's commitment to improving lives through vascular imaging, please contact Anne C. Aumell, M.A., CFRE, director for philanthropy, at aaumell@uw.edu or 206.221.0832, or Elizabeth Perera, director for philanthropy, at eperera@uw.edu or 206.221.2915. Thank you for your interest in our work.

Key Faculty



Thomas Hatsukami, M.D., FACS

*UW Professor of Surgery, Division of Vascular Surgery
 Founder and Co-director, Vascular Imaging Lab*

Dr. Hatsukami earned an undergraduate degree at Stanford University and a medical degree from the University of California, Los Angeles. Following his residency training in general surgery and a fellowship in vascular surgery at UW Medicine, he served as a senior research fellow under the mentorship of D. Eugene Strandness, Jr., M.D., whose pioneering work is credited for the development of vascular duplex ultrasonography, widely used in current clinical practice.



Chun Yuan, Ph.D., FISMRM, FAHA

*UW Professor, Department of Radiology and Department of Bioengineering
 Co-director, Vascular Imaging Lab
 Director, Bio-molecular Imaging Center*

Dr. Yuan received a B.S. in physics from Beijing Normal University, China, in 1982. He received a Ph.D. in biomedical physics from the University of Utah in 1988. A pioneer in vascular imaging, his expertise is focused upon magnetic resonance imaging techniques with cardiovascular applications.